

terrifying character, or it may be really aposematic for certain mammals and birds, to which it may be distasteful. I cannot find from other sources that the Kafirs here have any superstitions with regard to it; the only insects they take any interest in seem to be the various beetles and larvæ which they eat.

26. INSECT STRIDULATION AS A WARNING OR INTIMIDATING CHARACTER. (G. A. K. M.)

*Salisbury, April 19, 1901.*—I have been thinking of trying to get some material together to support the view that stridulation in insects where occurring in both sexes may be explained in a large number of cases as a warning character, its value in this respect being especially well brought out in a number of obscurely-coloured Heteromera, etc., which are known to be distasteful, while it is largely absent in brightly-coloured, distasteful groups, as *Cetoniidæ*, *Mylabridæ*, *Lycidæ*, etc. I should also expect to find it more prevalent among distasteful nocturnal species, where warning colours are of little avail. One of my chief difficulties lies in the larval stridulating organs in Coleoptera referred to by Gahan in his interesting paper (Trans. Ent. Soc. Lond., 1900, p. 433), and I should be much interested if you could kindly tell me whether these larvæ really do stridulate, for I see that Sharp (Camb. Nat. Hist. Ins., Vol. II, p. 198) throws much doubt on the larval stridulation of *Melolonthidæ* and *Scarabæidæ* suggested by Schiödte. *Lucanus cervus* seems to be a well-authenticated case, and it would be most interesting to know whether the larva is distasteful. Darwin's suggestion as to the acquirement of stridulation by one sex and its subsequent transference to the other has always seemed to me unsatisfactory, and its possible warning value occurred to me immediately I began experimenting with Coleoptera. Of course in some cases it might be pseud-apsematic, as in Hymenoptera-like Longicorns in which it would suggest the shrill, angry buzz of a wasp. Pocock has already suggested this explanation with reference to scorpions and Mygale spiders, but I am not aware of any one else having referred to it.

[For this interesting investigation a piece of apparatus invented for me by my friend Mr. G. J. Burch, F.R.S., would be extremely useful. It consists of an ordinary double

stethoscope (for both ears) with the usual form of end-piece replaced by a cork traversed by a glass tube about one-eighth of an inch in internal diameter, and with its terminal lip very slightly expanded into a small funnel. If, while the ear-pieces are inserted in both ears, the open end be moved about near to a stridulating insect, an extraordinary reinforcement of sound takes place as the source is approached, so great indeed that I found no difficulty in localizing it within a small area. Excessively minute sounds become clearly audible by the use of this valuable and simple piece of apparatus. If there be good reason to suppose that the stridulation of any insect is inaudible to us, viz. if the structure of its organ and the movements set up as a result of irritation suggest stridulation, it would be feasible, I believe, to transmit the vibrations to some recording surface other than the tympanum of the human ear, and thus to investigate them.

It is usually possible to distinguish readily between the sounds which are emitted in courtship and those which are produced on irritation and are probably of a warning or terrifying significance, inasmuch as they arise from quite different stimuli and tend to be accompanied by characteristic movements or attitudes. This latter association is exhibited by the imago of *Acherontia atropos*, and the snapping sound made by its larva, due to the movements of the mandibles, is also of terrifying significance. I have once heard the epigamic sound of *Halius prasinana*, but only when the male was pursuing the female and the whole mode of flight was subordinated to the ends of courtship. Generally speaking, any sound produced by both sexes on irritation or attack, and accompanied by threatening attitudes or movements (as of the mandibles), or merely violent struggles, is to be interpreted, with a high degree of probability, as a warning or intimidating character. The decision between warning and intimidation can only be arrived at after an experimental investigation into the qualities of each separate species.

Pseudaposematic sounds are also well known in birds, especially those which build in holes in trees and hiss like a snake when disturbed. Many lizards also hiss when extremely irritated. Professor J. W. Gregory, F.R.S., describes a grasshopper at Kurawa which hissed so that he at first mistook it for a snake ("The Great Rift Valley," London, 1896, p. 273).—E. B. P.]